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DEPARTMENT OF COMMERCE.
BUREAU OF STANDARDS.
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UNITED STATES GOVERNMENT SPECIFICATION FOR NUMBERED COTTON DUCK.[1]

FEDERAL SPECIFICATIONS BOARD.

STANDARD SPECIFICATION NO. 53.

This specification was officially adopted by the Federal Specifications Board on February 1, 1923, for the use of the Departments and Independent Establishments of the Government in the purchase of numbered cotton duck.

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1. INTRODUCTION.

This specification was drawn up by the Cotton Duck Association and several of the large Government departments. The results of tests made at the Bureau of Standards were used to establish most of the tolerances and figures.

2. MATERIAL.

The duck shall be made of cotton thoroughly cleaned and free from waste. It shall be evenly woven without sizing, and shall be free from an excessive number of avoidable imperfections of manufacture.

[1] This specification was adopted by the Cotton Duck Association.

3. WEAVE.

The weave shall be plain.

4. WIDTH.

The average width shall be as specified with the following tolerances:

Widths up to and including—	Inch.
36 inches	$-\frac{1}{4}$ to $+\frac{1}{4}$
37 to 60 inches	$-\frac{1}{4}$ to $+\frac{3}{8}$
61 to 80 inches	$-\frac{3}{8}$ to $+\frac{5}{8}$
81 to 120 inches	$-\frac{3}{8}$ to $+\frac{3}{4}$

5. WEIGHT.

The requirements for weight shall be as given in the table below with a tolerance of 2½ per cent, plus or minus.

6. CONSTRUCTION AND COUNT.

The number of ply and the count (or number of threads per inch, warp and filling) shall not be uniformly less than shown in the table below. They may be exceeded in the discretion of the manufacturer. The allowable variation from the manufacturers' standard count shall not exceed, within a bolt or roll, for the WARP:

±1½ threads in fabrics counting not over 40 threads per inch;
±2 threads in fabrics counting over 40 threads per inch;

and for the FILLING:

±1 thread in fabrics counting not over 25 threads per inch;
±1½ threads in fabrics counting from 25½ to 32 threads per inch;
±2 threads in fabrics counting over 32 threads per inch.

The count shall be determined by ascertaining the number of threads in 3 inches, taken consecutively, and reducing to terms of 1 inch. The warp count shall not be taken at less than 8 inches from either selvage for goods 26 inches or more in width; for goods under 26 inches it shall not be taken nearer the selvage than one-fourth of the entire width of the fabric.

7. METHOD OF TESTING.

From each delivery of 1,000 yards or fraction thereof a sample of not more than 2 linear yards shall be cut from any part of at least two rolls for test purposes.

Tests may be made under prevailing atmospheric comditions, except in the settlement of disputes concerning weight and strength. Such tests shall then be made upon material having normal moisture content, obtained by exposure for at least four hours

to an atmosphere of 65 per cent relative humidity at 70° F. temperature.

All tests for breaking strength shall be made on an approved type of inclination balance breaking machine. The maximum capacity of the machine shall be 800 pounds.

The 1 by 1 by 3 inches grab method of testing shall be used, defined as follows: The lower half of each pair of jaws shall be 2 inches or more in width and the upper half shall be 1 inch in width. Jaws shall be planed smooth and flat with edges slightly rounded to prevent cutting. The initial length of the test pieces between the jaws of the testing machine shall be 3 inches, and the pulling jaw shall travel at a uniform rate of 12 inches per minute. Six test pieces, 6 inches long by 4 inches wide, shall be cut, three in the direction of the warp and three in the direction of the filling, respectively. Care shall be taken that no two test pieces include the same threads. The average result of the tests shall be recorded separately for warp and filling. No sample for testing shall be taken at less than 8 inches from either selvage for goods 26 inches or more in width, or for goods under 26 inches at less than one-fourth of the entire width of the fabric. If the width of the goods does not admit of cutting pieces as stated above, they shall be taken as near the center as possible.

In the case of a break evidently below the general average for the fabric, a second test on the same threads shall be made and this test shall then be used in obtaining the average result.

In the event of a dispute regarding measurements, the material shall be placed under sufficient tension to make it lie flat upon a table, or other plane surface, and exposed to an atmosphere of 65 per cent relative humidity at 70° F. temperature, and when measured under these conditions the yardage delivered shall be not less than the invoiced yardage.

8. CAUSES FOR REJECTION.

In the event of a dispute in regard to width, the average width shall be determined by measuring in not less than five places about equally distant, throughout the length of the bolt or roll. In no place shall the variation in width be more than one-eighth inch greater than the tolerance for average width specified in paragraph entitled "Width."

In the event of a dispute in regard to weight, the weight per square yard shall be determined from the nominal width, the invoiced yardage (verified when necessary), and the actual weight of

the entire bolt or roll. The results of tests on 1 or 2 yards for width and weight shall not be used alone as a basis for rejection.

No rolls or bolts running less than 10 per cent under the strength specified shall be rejected, provided the delivery in question shall average up to specifications.

No rolls or bolts shall be rejected, the combined strength of the warp and filling of which shall be equal to the combined strength specified in the table below, provided neither element is more than 10 per cent under the requirements applying to that element.

9. DEFINITION.

The terms "bolts" or "rolls" as used above are hereby defined as meaning continuous lengths averaging from 100 to 110 yards, but a roll or bolt of not less than 85 yards will constitute a good commercial delivery.

TABLE 1.—Construction, Weight, and Strength.

No. of duck.	Weight.		Width.	Distance of selvage stripe from edge.	Minimum ply.		Minimum thread count per linear inch.		Breaking strength 1 by 1 by 3 inches grab.	
	Per linear yard 22 inches wide.	Per square yard.			Warp.	Filling.	Warp.	Filling.	Warp.	Filling.
Hard texture:	Ounces.	Ounces.	Inches.	Inches.					Pounds.	Pounds.
2/0	20	32.72	As specified	2	5	7	26	18	465	435
1/0	19	31.09	do	2	5	6	26	18	450	405
1	18	29.45	do	1¾	5	5	26	19	440	370
2	17	27.82	do	1¾	5	5	27	21	420	345
3	16	26.18	do	1½	4	5	29	21	390	330
4	15	24.54	do	1½	4	4	29	22	375	300
5	14	22.90	do	1½	3	4	34	24	345	285
6	13	21.27	do	1¼	3	3	34	26	335	250
7	12	19.63	do	1¼	3	3	35	22	300	240
8	11	18.00	do	1⅛	3	3	33	23	285	210
9	10	16.36	do	1	3	3	38	25	255	195
10	9	14.72	do	1	3	3	44	26	245	160
11	8	13.08	do	1	3	2	44	32	235	125
12	7	11.45	do	1	{2 {3	2 2	48 40	34 34	} 195	120
Medium texture:										
2/0	20	32.72	do	2	5	8	26	16	450	405
1/0	19	31.09	do	2	5	6	26	16	435	380
1	18	29.45	do	1¾	5	5	26	17	425	345
2	17	27.82	do	1¾	5	5	26	16	410	320
3	16	26.18	do	1½	4	5	26	17	370	315
4	15	24.54	do	1½	4	4	28	19	350	290
5	14	22.90	do	1½	3	4	28	20	315	285
6	13	21.27	do	1¼	3	3	34	20	305	250

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